WHAT IS CLAIMED IS:

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1. A device for etching a substrate (10), particularly a silicon element, with the aid of an inductively coupled plasma (14), having an ICP source (13) for generating a high frequency electromagnetic alternating field and having a reactor (15) for producing the inductively coupled plasma (14) from reactive particles by the action of the high frequency electromagnetic alternating field upon a reactive gas,
wherein a first means is provided which produces a static or timewise varying magnetic field between the substrate (10) and the ICP source (13).

2. The device as recited in Claim 1,
wherein the first means surrounds the reactor (15) at least in some regions between the ICP source (13) and the substrate (10), in this region the wall of the reactor (15) being formed by a spacer (22).

3. The device as recited in Claim 1 or 2,
wherein the first means is a magnetic field coil (21) having an appertaining current supply unit (23) or is a permanent magnet.

4. The device as recited in Claim 3,
wherein the magnetic field produced by the magnetic field coil (21) is variable timewise, especially pulsable, with the current supply unit (23).

5. The device as recited in Claim 1,
wherein the substrate (10) is positioned on a substrate electrode (11), and via the latter is able to be acted upon by a substrate voltage generator (12) with a continuous or timewise varying, especially a pulsed high frequency power.

6. The device as recited in Claim 1,
wherein the reactor (15) on its inside has an aperture concentric with the reactor wall, positioned between the first means for producing the magnetic field and the substrate (10).

7. The device as recited in at least one of the preceding claims,
wherein a second means is provided with which a plasma power coupled by the ICP source (13) into the inductively coupled plasma (14) via the high frequency electromagnetic alternating field, can be set.

8. The device as recited in Claim 7,
wherein the second means is an ICP coil generator (17) which produces a variably adjustable high frequency power, particularly periodically varying or pulsed, which can be coupled as plasma power into the plasma (14).

9. The device as recited in Claim 8,
wherein, using the ICP coil generator (17), an average plasma power of 300 watt to 5000 watt can be coupled into the inductively coupled plasma (14).

10. The device as recited in Claim 7,
wherein a second impedance transformer (18) is provided in the form of an especially balanced symmetrical matching network for matching an output impedance of the ICP coil generator (17) to a plasma impedance which is a function of the coupled-in plasma power.

11. The device as recited in Claim 10,
wherein the second impedance transformer (18) is preset in such a way that an at least largely optimal impedance matching is ensured, in response to a predefined maximum plasma power to be coupled into the inductively coupled plasma (14).

12. The device as recited in Claim 8,
wherein components are integrated into the ICP coil generator (17) which carry out a variation of the frequency of the generated electromagnetic alternating field, for matching the impedance as a function of the plasma power to be coupled in.

13. The device as recited in Claim 12,
wherein, for varying the frequency, the ICP coil generator (17) is provided with an automatically acting feedback circuit having a frequency-selected component (1).

14. The device as recited in at least one of Claims 8 through 13,
wherein the ICP coil generator (17) is furnished with at least one regulated power element, one frequency-selective band-pass filter having a steady-state frequency (1") to be reached, and a delay line (7) or a phase shifter.

15. The device as recited in at least one of the preceding claims,
wherein the IC coil generator (17) is in connection with the current supply unit (23) and/or the substrate voltage generator (12).

16. A method for etching a substrate (10), especially a silicon element, using a device as recited in at least one of the preceding claims,
wherein, during the etching, a static or timewise varying, particularly a periodically varying or pulsed magnetic field is produced, whose direction is at least approximately or predominantly parallel to the direction defined by the connecting line of the substrate (10) and the inductively coupled plasma (14).

17. The method as recited in Claim 16,
wherein the magnetic field is produced in such a way that it extends into the region of the substrate (10) and the inductively coupled plasma (14).

18. The method as recited in Claim 16,
wherein the magnetic field is produced using an amplitude of the field strength, on the inside of the reactor (15), between 10 mTesla and 100 mTesla.

19. The method as recited in Claim 16,
wherein the inductively coupled plasma (14) is produced with a high frequency elctromagnetic alternating field having a constant frequency, or with a frequency varying, within a frequency range, about a steady-state frequency (1''), especially 13.56 MHz.

20. The method as recited in Claim 16,
wherein the etching takes place in alternating etching and passivating steps.

21. The method as recited in Claim 16,
wherein the etching takes place at a process pressure of 5 μbar to 100 μbar and a coupled-in average plasma power of 300 watt to 5000 watt.

22. The method as recited in Claim 16,
wherein a pulsed magnetic field is produced, via a current supply unit (23), whose amplitude of the field strength, on the inside of the reactor (15), lies between 10 mTesla and 100 mTesla.

23. The method as recited in Claim 22,
wherein the magnetic field is pulsed at a frequency of 10 Hz to 20 kHz, and a pulse/pause ratio of 1:1 to 1:100 is set.

24. The method as recited in at least one of the preceding claims,
wherein a variably adjustable, particularly periodically varying or pulsed high frequency power is produced and is coupled as plasma power into the inductively coupled plasma (14).

25. The method as recited in Claim 24,
wherein an ICP coil generator (17) having a frequency of 10 Hz to 1 MHz is operated in pulsed fashion for producing the plasma power, and an average plasma power of 300 watt to 5000 watt is thereby coupled into the inductively coupled plasma (14).

26. The method as recited in Claim 25,
wherein the ICP coil generator (17) is operated using a pulse/pause ratio of 1:1 to 1:100.

27. The method as recited in Claim 24,
wherein the pulsing of the coupled-in plasma power is accompanied by a change in the frequency of the coupled-in high frequency power.

28. The method as recited in Claim 27,
wherein the frequency change is controlled in such a way that the plasma power coupled into the inductively coupled plasma (14) during the pulsing is maximum.

29. The method as recited in Claim 27,
wherein the ICP coil generator (17) is operated in the form of an automatically acting feedback circuit, and the frequency of the high frequency power produced, which forms the coupled-in high frequency electromagnetic alternating field, is varied about the steady-state frequency (1'').

30. The method as recited in at least one of the preceding

claims, wherein the pulsing of the magnetic field correlates in time or is synchronized with the pulsing of the coupled-in plasma power and/or the pulsing of the high frequency power coupled into the substrate (10) via the substrate voltage generator (12).

31. The method as recited in Claim 29, wherein the synchronization takes place in such a way that the magnetic field is first applied before a high frequency power pulse of the ICP coil generator (30) for the coupling of the plasma power into the inductively coupled plasma (14), and the magnetic field is only switched off again after the high frequency power pulse has faded out.

32. The method as recited in Claim 30, wherein the pulse/pause ratio of the magnetic field pulses is greater than the pulse/pause ratio of the high frequency power pulses, and the magnetic field is held at least approximately constant during the high frequency power pulses.

ADD A_1 >